Transport Policy 48 (2016) 1–12

Contents lists available at ScienceDirect

Transport Policy

journal homepage: www.elsevier.com/locate/tranpol

Border crossing design in light of the ASEAN Economic Community: Simulation based approach

Sathaporn Opasanon [a,*], Songyot Kitthamkesorn [b]

[a] Department of International Business, Logistics & Transport, Faculty of Commerce & Accountancy, Thammasat University, Bangkok 10200, Thailand
[b] Department of Civil Engineering, Chiang Mai University, Chiang Mai, Thailand

ARTICLE INFO

Article history:
Received 7 June 2015
Received in revised form
22 February 2016
Accepted 22 February 2016
Available online 3 March 2016

Keywords:
Cross Border
Customs Post
Immigration
Collaborative Border Management
Clearance Control
Logistics
Simulation

ABSTRACT

Customs post is a logistics infrastructure playing a critical role in international transportation. This research provides a systematic framework and simulation analysis for designing operations and infrastructure for modern customs and cross-border transport. A case study of the largest customs post of Thailand in terms of cargo traffic, is carried out to portray the procedural steps of the proposed approach. Literature review and in-depth interviews with associated control agencies were conducted to identify required infrastructure components, border clearance procedures and customs formality in light of the ASEAN Economic Community. Linear regression models were developed to predict the future annual volume of traveler and vehicle flow. Simulation models were constructed to justify various operations and designs of key border-crossing facilities, including immigration control booths, vehicle inspection station and truck clearance area. The principles of transport and trade facilitation were adopted to ensure the effectiveness and efficiency of border crossing process. The results suggest that split configuration with joint inspections on both sides is the most practicable border control for the customs post where joint customs inspection is performed in the country of entry. To avoid unnecessary traffic interruption by different types of traffic, passenger and freight flow are separated in the design. For personal vehicles, a drive-through border crossing is proposed to allow a driver to obtain immigration and customs checks via the vehicle inspection booths without getting off the car. The analytical framework and simulation analysis proposed in this research is practical and useful for analyzing the design of other customs posts with similar traffic and cross-border patterns.

1. Introduction

Thailand is located at the centre of the Indochina peninsula in South East Asia and shares the borders with Myanmar and Lao People's Democratic Republic (Lao PDR) in the North, Myanmar and the Andaman Sea in the West, Lao PDR and Cambodia in the East, and the Gulf of Thailand and Malaysia in the South. The coastal land in the South of the country is surrounded by both the Gulf of Thailand and the Andaman Sea. For several decades, Thailand's government has been investing in large civil infrastructure projects throughout the country, many of which are aimed at improving the efficiency of logistics operations (Paraphantakul et al., 2012). Examples of such projects include the development of a network of highways linking with neighboring countries, along with upgrading/expansion of border infrastructure and providing both domestic and international connectivity. Given the country's strategic location and enhanced logistics infrastructure, Thailand is emerging as a logistics hub in Southeast Asia (Opasanon, 2012).

The Association of South East Asian Nations (ASEAN) has agreed to establish a regional economic integration, namely the Asian Economic Community (AEC) by 2015 to promote the whole region as a single market and production base. The main objective of the AEC is to transform ASEAN into a region with free movement of goods, services, investment, skilled labour, and freer flow of capital (ASEAN Economic Community, 2014). Among the ASEAN countries, Indonesia, Malaysia and Thailand, have formed another subregional economic cooperation, entitled the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT). Physical connectivity of the IMT-GT subregions has been strengthen with the upgrading of road, airport and port infrastructure (Centre for IMT-GT Subregional Cooperation, 2009). Consequently, the trades among the three countries in the Growth Triangle have been increasing, and thus cross-border transportation plays an essential role in facilitating the growth of trade volume between Thailand and Malaysia. Similar to most

* Corresponding author.
E-mail addresses: opasanon@tu.ac.th (S. Opasanon), songyot@eng.cmu.ac.th (S. Kitthamkesorn).

http://dx.doi.org/10.1016/j.tranpol.2016.02.009
0967-070X/

countries sharing borders, Thailand–Malaysia's border crossings rely heavily on road transport. Sadao customs post, currently the largest customs post of Thailand in terms of cargo throughput, has become a critical component in logistics connectivity for border crossings between Thailand and Malaysia. As more Thai businesses engage in international trade in light of the formation of AEC and IMT-GT, the expansion of Sadao customs post is needed.

As the performance of transit and inter-state transport is significantly influenced by cross-border clearance, this research aims at designing customs infrastructure and related border control facilities at the new Sadao customs post to accommodate future traffic of goods and people, as well as modern cross-border practice. The design adopts the principles that facilitate cross-border transport and that promote collaboration of all relevant government authorities and business sector between neighboring countries. Particularly, Collaborative Border Management (CBM) is incorporated into the infrastructure design to expedite business transactions and simultaneously enable the safe movement of freights and travelers across borders. Future demand of Sadao border crossings is forecasted, based on historical data along with the anticipated economic impact of AEC and IMT-GT. Various computer simulation models are constructed to design infrastructure and facilities required for effective border and customs clearance with the objective of reducing congestion and individual waiting times. The detailed demand forecasting and simulation modeling for the development of the new Sadao customs post in phase I (the first 5 years of development) are presented.

2. Background and literature review

2.1. Sadao customs post

Sadao customs post is located in Sadao District of Songkhla Province in the southern part of Thailand. It is connected to the Phetkasem Road (Highway No. 4), which is the main highway to Malaysia's Highway No. 1, leading to Kuala Lumpur and Singapore. This highway network is in the economic development area of the Economic-Corridor (Songkhla – Penang-Medan) and near the Automotive Industrial City Development Project. Thus, Sadao customs post becomes the gateway connecting economic areas of Thailand – Malaysia. In the advent of AEC and IMT-GT formation, it has potential of becoming the main logistics node to support the economic growth in the region and facilitate the trade traffic through the North Economic Corridor of Malaysia (Bankao News, 2012).

The border trade volume between Thailand and neighboring countries is constantly increasing thanks to the establishment of regional economic cooperation. The highest border trade value is Thailand – Malaysia with the proportion of 64 percent of all border trades or 497,590 million baht in 2010. The trade volume can be decomposed into import trade of 320,404 million baht and export trade of 177,186 million baht. Its main exports are natural rubbers, non-vulcanized rubbers, computer parts, computers, and electric motors. The main imports are magnetic tapes and discs, computer parts, integrated circuits, and electronic control circuits. Currently, Sadao customs post handles the annual import-export trade of 300,000 million baht, making itself the largest customs post of Thailand in terms of trade value. Approximately 4.1 million travelers pass though Sadao customs post per year with the annual growth rate of 20 percent (Department of Customs, 2012).

These dramatic increases in border crossings result in severe traffic congestion inside the existing Sadao customs post and surrounding areas, subsequently worsening service level of the border clearance processes. For this reason, the Department of Customs has initiated the project of constructing another customs post at a new location to serve as the main post for both freight and traveler traffic, leaving the existing one for traveler traffic only. This new Sadao customs post comprises border, veterinary, health and other clearance stations in the same area. The location of the new customs post is in Paklonglapang National Forest, Sadao District, Songkhla Province. Its construction site is approximately 600 m from the current location. The project approximately covers an area of 1.12 million square meter, anticipated to serve the increasing travelers and vehicles for the next 20 years (Sadao Customs House, 2011). The project location is illustrated in Fig. 1.

2.2. Cross border management

Cross border trade and transport facilitation is considered one of the significant drivers in the advancement of economic development, which in turn leads to the promotion of regional stability and cooperation (OSCE and UNECE, 2012). Improved infrastructure, together with expanded cross-border cooperation among the neighboring countries is expected to expedite the process of integrating the subregional economic corridors into the global market. However, it has been observed that border crossings still remain the weakest links in many economic corridors (Banomyong, 2010). This leads to the need for the designs of both infrastructure and associated operations facilitating cross-border movements of goods and people.

Conventionally, the key role of customs and other border management agencies has been to collect revenue and taxes on goods while keeping national security from border threats such as smuggling of prohibited goods and terrorism (McLinden et al., 2011). With the reduction of trade barriers through Free Trade Agreements (FTAs), this role has shifted to trade facilitation as effective controls, clearance and transit can connect national industries with the global supply chain, and also attract direct foreign investment (OSCE and UNECE, 2012). As the concepts of Logistics and Supply Chain Management ensuring an utmost integrity and punctuality of product delivery have long been known for enhancing business competitiveness, applying these concepts with modern border management can streamline border clearance processes through collaboration among all related parties and eliminate of complicated but unnecessary activities.

The concept of Collaborative Border Management (CBM) enables agencies and the international community to work together in achieving common aims of all parties. CBM also features the concept of a 'virtual border' encompassing the entire transport and supply chain where goods and travelers can be assessed for admissibility and clearance in advance of arriving at the physical border (Doyle, 2010). Although institutional reform of border clearance procedures has received attention at national level from relevant authorities and business sector, the upgrading of infrastructure and facilities remains a crucial step in enhancing the effectiveness of regulatory control and trade facilitation processes (OSCE and UNECE, 2012). Nevertheless, it has been experienced that without the adoption of modern approaches to managing traveler and cargo flows, the improvement of border-crossing infrastructure rarely contributes to better border management outcomes (McLinden et al., 2011).

2.3. Simulation

Simulation is a powerful tool for modeling, planning and controlling complicated operational systems. It has been used in various objectives, including identifying bottlenecks, testing hypotheses, studying system behaviors, forecasting future events, testing new designs and exploring new policies (Pegden et al., 1995). Particularly, many researchers have employed discrete event simulation model for process analysis and improvement.